REMARKS

The title has been changed to be more clearly indicative of the invention.

In the Office action dated 12/30/04, the Examiner allowed claims 24-26, rejected claims 1,2,10,20-23, 27, 30, and 31, and indicated that claims 3-9, 11-19, 28, 29, 32 and 33 would be allowable if rewritten in independent form including all the limitation s of the base claim and intervening claims. However, the applicant strongly believes that all of the originally-submitted claims are clearly non-obvious in view of the cited art and should also be allowed. Thus, it is preferred for simplicity to retain the objected-to claims 3-9, 11-19, 28, 29, 32 and 33 in their original form. All of the pending claims have been repeated above for the Examiner's convenience.

Reconsideration and withdrawal of the rejection of claim 1 under §103 on Zuk et al ('401 patent) in view of Yoshida ('704 published application) are respectfully requested in view of the following remarks.

In rejecting claim 1 on the '401 patent, it is believed that the Examiner relies on Figs. 4 and 8 of the '401 patent, which discloses elements #4a-4c and 2a-2c to correspond to the recital in claim 1 of a annular conical section of permanent magnetic material.

Firstly, it is evident from Fig. 1 of the '401 patent that there is no resemblance between the Zuk concepts and those of the applicant. In Fig. 1, the structure 2, 4 is configured to correspond in size to the head being imaged. There is no apparent showing or teaching of a widened cavity surrounding the region of interest in the inner cavity to accommodate, for example, the wider shoulders of a patient. In fact, it is clear that the patient's shoulders are wider than the space between the sections 2 and 4.

As is explained at great length in the applicant's specification, the permanent magnetic conical structure has the important merit that it can provide a uniform magnetic field capable of supporting MRI imaging in a region of interest that accommodates the patient's head, as well as a larger region around the patient's head to accommodate the larger shoulders of the patient and that also has a magnetic field that can be configured so as not to significantly distort the desired uniformity in the region of interest. For this including other possible purposes, the transition region is provided.

In this aspect of the invention, the narrow end of the cone must be closer to the region of interest for the smaller head portion, and the wider end of the cone must be further from the region of interest for the larger shoulder portion. See, for example, Fig. 7 of the instant drawings in which 54 represents the patient's head and 56 his or her shoulders. The larger body portion fits within the larger cavity beyond the plane of the drawing.

There is nothing similar to the above in the '401 patent however you interpret it, since, among other things, in the applicant's view, 3 spaced concentric cylinders are not the equivalent of a conical structure. Moreover, it is also evident from Figs. 2 and 9 of Zuk, that even if, arguendo, the 3 spaced concentric cylinders are considered the equivalent of a conical structure, they are positioned in reverse, namely, the region of interest is designated 18, and the inner magnet 4c is further from the region of interest 14 than are the outer magnets 4b, 4a. So the Zuk taper, if one can call it that, is backwards!

It is pointed out that Para. b)i) of claim 1 clearly recites that the narrow end of the cone is closer to the region of interest than the wider end. This modification of Zuk cannot possibly be derived from the Zuk teachings, since it is plain that the conical magnet was never taught by Zuk, and that Zuk did not concern himself with the problems of providing MRI imaging using the conical magnet for the reasons pointed out above. Fig. 1 of Zuk shows no consideration of the patient's shoulders, except to place them completely outside of the magnetic structure.

It is further pointed out that Para. b)ii) of claim 1 clearly recites that the inner essentially cylindrical magnetic section is magnetically coupled to the wider end of the conical section, corresponding to element 20 in applicant's Fig. 4. For reasons similar to those expressed above, this construction assists in maintaining the larger cavity (34 in Fig. 7) for the patient's larger shoulders.

In comparison, Zuk again teaches in the opposite direction, since his outer magnetic section 4a is coupled to the "wider" end of the structure , again assuming that 3 cylinders is a cone. And again, no similar modification of Zuk can be derived from Zuk for the reasons expressed above, namely, no cone, and no desire for shoulder accommodation.

Hence, for these reasons, it is submitted that claim 1 is clearly non-obvious over the '401 patent and must be allowed.

Claim 2, dependent on claim 1, should be allowable for the same reasons and for the additional reason that claim 2 recites that a pole piece member of ferromagnetic material, i.e., soft magnetic material, is positioned within the conical permanent magnetic section and is axially aligned with the common longitudinal axis. For this claim element, the Examiner relies on cols. 27-28, lines 60-67 and 1-11, respectively of the '401 patent.

This is respectfully controverted. The referenced specification portions of Zuk speak first of permanent magnets, which are not pole piece members of ferromagnetic material, i.e., soft magnetic material. Secondly, the Zuk section refers to "yoke" structures. Yoke structures are a term of art typically designating the outer soft ferromagnetic members that complete the magnetic path outside of the main structures. See, for example, elements 60, 62, 64 of Fig. 7 of the applicant's drawings which function as a yoke. This Zuk teaching could not possible lead the person of ordinary skill in the art to the positioning of a pole piece member of ferromagnetic material inside the conical section!

Hence, claim 2 is additionally patentable over the '401 patent for this reason.

Claim 10, which is dependent on claims 1 and 2, should be allowable for the same reasons. Additionally, it will be noted that claim 10 recites an outer cylindrical permanent magnetic section extending over the inner cylindrical magnetic section and over the ferromagnetic pole piece positioned inside the cone. There is no counterpart element in Zuk. 52 and 54 in Fig. 4 of the '401 patent are printed circuit assemblies, not permanent magnetic structures. There are no other permanent magnetic members that are over the 3 cylindrical permanent magnets in Zuk. So, claim 10 is considered clearly patentable for this additional reason.

Claims 20-23, which depend from claim 10, are also additionally patentable over the '401 patent for the same reasons, in addition to the fact that claims 20-23, through claim 10, are also dependent on claims 2 and 1 which are deemed patentable for the reasons expressed above.

With regard to the transition means claim element, the Examiner states he relies on Davies, though the basic rejection in Para. 3 of the Office Action specifies the '704 published application of Yoshida. Since Davies relates mainly to surveillance involving circuit details, and Yoshida relates to MRI and the Examiner references Para. 0047, which is characteristic of published applications, it is presumed that the Examiner meant Yoshida where he stated Davies, and the rejection will be treated on that assumption.

It will be noted that the '704 published application concerns MRI accomplished with electromagnetic coils for producing the main uniform field. See Para. 0058 which refers to a main magnetic field coil section, a gradient coil section and an RF coil section. MRI systems that use coils for the main field bear no resemblance to MRI systems using permanent magnets for the main field. The problems raised are essentially different and different solutions are needed.

Moreover, it is pointed out that Para. 0047 refers to preventing "magnetic coupling" between two coils, namely, the transmitting coil and the RF coil. No coils are recited in any of the applicant's claims. Hence, it does not seem possible to combine any teachings in the '704 published application which relate to magnetic coupling between coils with anything in the '401 patent to arrive directly or indirectly at any of the applicant's teachings of distortion preventing means arising out of a magnetic structure mainly composed of magnetic materials! Coupling problems involving coils corrupt desired electrical signals. This has no apparent relevance to maintaining a main uniform magnetic field capable of MRI imaging and provided mainly by permanent magnets.

Hence, it is submitted that the addition of the teachings of the '704 published application to that of the '401 patent does not render obvious any of the applicant's claims.

Method claims 27, 28 and article claim 30 relate to the field distortion compensation of the applicant's novel structure, which it will be noted includes features that were previously claimed in several of the structure claims and which it has been argued above are clearly additionally patentable over the prior art. This includes the inner ferromagnetic pole piece and the positioning of the outer cylindrical magnetic structure over the latter. Hence, for this reason alone, these rejected claims should be allowed.

In addition, it is pointed out that independent claims 27 and 30 call for a ring of permanent magnetic material placed on the outer conical surface at the bottom of the conical section. The Examiner does not seem to have addressed the presence of this claim element in these rejected claims. The undersigned cannot find in the cited art any teaching of a ring of permanent magnetic material placed on the outer conical surface at the bottom of the conical section. Since, none of the cited art seems to teach conical permanent magnets for producing the main magnetic field, and none seem to teach the use of rings of permanent magnetic material for compensation means, there appears to be no basis for rejecting these claims 27, 30, and 31, and thus reconsideration and withdrawal are respectfully requested.

It is believed that the present amendment places the case in condition for allowance, and such action is respectfully solicited.

Respectfully submitted
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